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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. (Currently Amended) A method of providing communication support for collaborative applications comprising:

abstracting a network and application server resources at a middleware level;

indexing the application server resources in a network aware and application aware manner to reflect positions of the application server resources in an application space;

indexing a plurality of users to reflect communication interests of the plurality of users in the application space; and

forming a communication overlay tree that provides communication links between the application server resources and the plurality of users, via the middleware level, the communication overlay tree comprising one or more nodes representing the application server resources, one or more nodes representing the plurality of users, one or more nodes representing middleware residing at the middleware level, and one or more nodes for clustering said one or more nodes representing the application server resources and the one or more nodes representing the plurality of users into groups, such that communications from said groups are routed via a single one of the communication links to one of the one or more nodes representing middleware.

2. – 11. (Cancelled)

12. (Currently Amended) A method of virtualizing network resources to support collaborative communications in a network having application servers and users that have communication interests, the method comprising the steps of:

constructing a scalable network map;

indexing the application servers according to ~~their position~~ positions of the application servers in the network;

indexing the users according to ~~their~~ communication ~~interest~~ interests of the users;

generating a communication overlay tree based on the indexing of the application servers, on the indexing of the users, and on the scalable network map, the communication overlay tree comprising one or more nodes representing the application servers, one or more nodes representing the users, and one or more nodes for clustering said one or more nodes representing the application servers and the one or more nodes representing the users into groups, such that communications between said groups are routed via communication links; and

supporting communications between the application servers and the users over the communication overlay tree.

13. (Previously Presented) The method of claim 12 wherein the scalable network map is further based on supporting service level agreements.

14. (Original) The method of claim 12 wherein supporting communications includes operating according to middleware software.

15. (Original) The method of claim 12 wherein generating a communication overlay tree is repeated upon changes to the network.

16. (Original) The method of claim 12 wherein indexing users includes indexing a new user to the network.

17. (Original) The method of claim 12 wherein an application server is indexed if it enters the network.

18. (Currently Amended) A method of operating a communication network,

comprising the steps of:

identifying a plurality of network resources and ~~their~~ network constraints of the plurality of network resources;

identifying a plurality of application servers that are controlled by an application having an application space;

identifying a plurality of users and a communication interest in the application space of each ~~user~~ of said plurality of users; and

indexing the plurality of application servers to reflect ~~their position~~ positions of the plurality of application servers in an attribute space;

indexing said plurality of users according to identified communication interests;

forming a user index identifier for each ~~user~~ of said plurality of users; and

establishing a communication overlay tree between the plurality of application servers and the plurality of users based on the ~~identified~~ network constraints and on the ~~indexed~~ plurality of users as indexed, the communication overlay tree providing communication links between the plurality of application servers and the plurality of users, the communication overlay tree comprising one or more nodes representing the plurality of application servers, one or more nodes representing the plurality of users, and one or more nodes for clustering said one or more nodes representing the plurality of application servers and the one or more nodes representing the plurality of users into groups, such that communications between said groups are routed via the communication links.

19. (Original) The method of claim 18, further including indexing network locations of each user of said plurality of users.

20. (Currently Amended) The method of claim 19, further including providing [the] an application with the user index identifier for each ~~user~~ of said plurality of users via [[an]] one of the plurality of application ~~server~~ servers.

21. (Currently Amended) The method of claim 20, further including sending data

from via [[an]] one of the plurality of application ~~server~~ servers to at least one user of said plurality of users based on the communication interest of the at least one user and on the user index identifier of the at least one user.

22. (Previously Presented) The method of claim 18 wherein indexing of the plurality of users includes indexing new users to the communication network.

23. (Original) The method of claim 18 wherein establishing the communication overlay tree is at least partially based on round trip travel times.